

NON-PUBLIC?: N
ACCESSION #: 9106100516
LICENSEE EVENT REPORT (LER)

FACILITY NAME: VOGTLE ELECTRIC GENERATING PLANT - UNIT 2 PAGE: 1
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DOCKET NUMBER: 05000425

TITLE: GENERATOR LOSS OF FIELD RESULTS IN AUTOMATIC REACTOR
TRIP

EVENT DATE: 05/07/91 LER #: 91-007-00 REPORT DATE: 06/04/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: MEHDI SHEIBANI, NUCLEAR SAFETY TELEPHONE: (404) 826-3201
AND COMPLIANCE

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: SB COMPONENT: PCV MANUFACTURER: M120
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 5-7-91 at 0948 CDT, several annunciators and alarms were received on the electrical auxiliary board in the Unit 2 control room. Immediately after receipt of the alarms, an automatic reactor trip occurred due to a trip of the Unit 2 turbine. Except for the tripping of non-1E breakers which supply turbine building lighting and the malfunction of a steam-dump-to-condenser valve, no other equipment malfunctions or abnormalities occurred following the reactor trip, and by 1010 CDT the plant was stabilized in Hot Standby.

A post-trip review of computer data, the plant fault recorder, and the protection relay panel revealed that a generator loss of field occurred just prior to the event, causing a generator trip which then caused the turbine/reactor trip. The root cause for the generator loss of field is

indeterminate. Extensive troubleshooting under the direction of a General Electric (GE) representative was performed on 5-8-91 with the generator shut down and on 5-9-91 with the generator at rated speed and voltage. No problem with the generator field excitation circuitry was found, and at 1941 CDT on 5-9-91 the generator was tied to the grid. Continuous monitoring via installed recorders was then performed with the generator online. After no abnormality was detected that might have caused the event, the recorders were removed on 5-19-91.

Subsequently, one recorder has been reinstalled to provide further monitoring of four points.

END OF ABSTRACT

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A. REQUIREMENT FOR REPORT

This report is required per 10 CFR 50.73 (a)(2)(iv) because the event resulted in an unplanned automatic actuation of the reactor protection system (RPS).

B. UNIT STATUS AT TIME OF EVENT

Unit 2 was operating in Mode 1 (Power Operation) at 100% of rated thermal power. There was no inoperable equipment which contributed to the occurrence or consequences of the event. However, the Unit 2 Train A diesel generator and the Train A engineered safety features (ESF) room cooler and safety-related chiller were out of service for maintenance.

C. DESCRIPTION OF EVENT

On 5-7-91 at 0948 CDT, several annunciators and alarms were received on the electrical auxiliary board in the Unit 2 control room. The alarms were followed immediately by an automatic reactor trip. The first-out annunciator was "Turbine Trip/P-9 Reactor Trip." On the reactor trip, all control rods were observed to fully insert, and a feedwater isolation (FWI) and an auxiliary feedwater (AFW) actuation occurred per design. After completing the immediate operator verifications required by emergency operating procedure 19000-C, "E-0 Reactor Trip or Safety Injection," emergency operating procedure 19001-C, "ES-0.1 Reactor Trip Response," was entered at 0955 CDT. At 0956 CDT, due to observed steam header pressure fluctuations and to limit the cooldown of the reactor coolant system (RCS), operator action was taken to close all the main steam

isolation valves (MSIVs) and the loop 2, 3, and 4 bypass steam isolation valves (BSIVs). By 1010 CDT, the plant was stabilized in Mode 3 (Hot Standby), and control room operators transitioned to unit operating procedure 12006-C, "Unit Cooldown to Cold Shutdown." Subsequent to the event, at 1341 CDT a steam-dump-to-condenser valve (2PV-507A) was found to be cycling instead of remaining closed. This had apparently caused the steam header pressure fluctuations observed following the reactor trip. The steam dump valve was isolated upon discovery.

One other equipment malfunction was observed during the event. During the residual transfer of a non-1E 4.16-kV bus from the unit auxiliary transformer to the reserve auxiliary transformer, breakers which supply power for Unit 2 turbine building lighting tripped open. These breakers were reclosed, and turbine building lighting was restored without incident.

D. CAUSE OF EVENT

The direct cause of the event was a loss of generator field. A post-trip review of plant computer data and the plant fault recorder revealed that a loss of generator field voltage occurred approximately 3.7 seconds prior to the event, causing a generator trip which then caused the turbine/reactor trip. A turbine trip initiates an automatic reactor trip when reactor power is greater than the P-9 reactor trip interlock (50% power). Additionally,

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the generator loss of field lockout relay was found tripped at the protection relay panel in the control room. This relay energizes when the generator loss of field excitation relay energizes.

The root cause of the event is indeterminate. It could not be determined whether the generator field shorting breaker closed before or after the loss of field relay energized. The calibration of the generator loss of field excitation relay was checked and was verified to be correct. Additionally, it was verified that no personnel were performing any activities within or near the generator collector housing, the generator field exciter cubicle, or the generator field regulator panel that could have caused the event.

Since the cause for the generator loss of field could not be readily determined, a General Electric (GE) representative familiar with the GENERREX field excitation system (i.e., the generator field

excitation system used at VEGP) was called in to coordinate troubleshooting. Troubleshooting performed on 5-7-91 and 5-8-91 included testing of the GENERREX analog circuitry by inputting simulated signals at the signal override circuit card, the field voltage regulator circuit card, the field input circuit card, and the stabilization and output circuit card. In each case, the applicable portion of the circuit was found to respond correctly. Additional troubleshooting performed on 5-8-91 included testing the generator field shorting breaker, checking the calibration of voltage transducers located in the exciter cubicle, verifying the proper operation of relays which tell the generator trip system that the generator is offline, inspecting the generator brushes, and "meggering" and checking continuity of the generator field. Again, no problem was found. On 5-9-91, the GENERREX synchronizer circuit card was also checked and was verified to be operating correctly.

Since troubleshooting with the generator offline could not identify the cause, a decision was made on 5-9-91 to proceed with reactor startup and then perform further troubleshooting once the generator had been brought up to rated speed and voltage. Several recorders were connected to various portions of the generator field excitation circuitry, and a design change was implemented to allow the plant computer to monitor the status of the generator field shorting breaker. A temporary modification was also implemented to defeat the Georgia Power designed backup circuitry for closing the generator field shorting breaker. By 1650 CDT on 5-9-91, a reactor restart had been completed, and the generator had been brought up to rated speed and voltage. Various methods were then utilized to initiate actuation of the generator field trip circuitry while monitoring the installed recorders. The generator field excitation and trip circuitry were found to be operating correctly with the generator at rated speed and voltage.

As a final test, the generator was tied to the grid at 1941 CDT on 5-9-91, and reactor power was held at 35% rated thermal power for approximately 24 hours while continuing to monitor the installed recorders. There was no indication of a problem in the generator field excitation circuitry

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with the generator tied to the grid, and reactor power was subsequently increased to 100% of rated thermal power. Monitoring via the installed recorders was continued until 5-19-91 without any indication of a problem that might have caused the event. On 5-19-91, the recorders connected to the generator field excitation

circuitry and the temporary modification defeating the GPC backup circuit for closing the generator field shorting breaker were removed.

After discussions with GE regarding further monitoring and/or testing, one of the recorders which had been connected to the excitation circuitry was reinstalled to provide further monitoring of four points. This recorder will remain installed until it is agreed that no additional relevant information is to be obtained.

The cause for the steam dump valve cycling was found to be a bent positioner feedback arm. The cause for the tripping of the breakers which supply Unit 2 turbine building lighting is still being investigated.

E. ANALYSIS OF EVENT

The results of the VEGP accident analyses for events that could possibly be initiated by a generator and/or turbine trip show that such events would present no hazard to the integrity of the RCS or the main steam system. A review of the current event showed that, following the generator loss of field, all systems functioned as designed to trip the generator and cause a turbine/reactor trip. On the reactor trip, all control rods fully inserted and a feedwater isolation and an auxiliary feedwater actuation occurred per design. Appropriate operator action was taken to close the MSIVs and thereby limit the cooldown of the RCS. Based on these considerations, there was no adverse effect on plant safety or on the health and safety of the public as a result of this event.

F. CORRECTIVE ACTIONS

1. A design change has been implemented to allow the plant computer to monitor the status of the generator field shorting breaker.
2. The positioner feedback arm for steam dump valve 2PV-507A has been replaced.
3. Investigation is in progress to determine the reason for the tripping of the breakers which supply Unit 2 turbine building lighting. This review is expected to be complete by 6-15-91.
4. One of the recorders which was connected to the generator field excitation circuitry has been reinstalled to provide further monitoring of four points. This recorder will remain installed

until it is agreed that no additional relevant information is to be obtained.

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G. ADDITIONAL INFORMATION

1. Failed Components Identification

Steam-Dump-to-Condenser Valve 2PV-507A
Masonelian 6-inch 40,000 Series Control Valve Equipped With
Spring Diaphragm Actuator, Bailey AP Series Positioner, and
Masonelian EX9000 I/P Transducer

2. Previous Similar Events

No previous events involving an unexplained loss of generator field excitation have occurred at VEGP.

3. Energy Industry Identification System Codes

Main Generator System - TB

Main Generator Excitation System - TL

Main/Reheat Steam System - SB

ATTACHMENT 1 TO 9106100516 PAGE 1 OF 1

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C. K. McCoy Georgia Power
Vice President Nuclear the southern electric system
Vogtle Project
June 4, 1991

ELV-02860
0993

Docket No. 50-425

U. S. Nuclear Regulatory Commission

ATTN: Document Control Desk
Washington, D. C. 20555

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
LICENSEE EVENT REPORT
GENERATOR LOSS OF FIELD RESULTS IN AUTOMATIC REACTOR TRIP

In accordance with 10 CFR 50.73, Georgia Power Company hereby submits the enclosed report related to an event which occurred on May 7, 1991.

Sincerely,

C. K. McCoy
CKM/NJS/gmb

Enclosure: LER 50-425/1991-007

xc: Georgia Power Company
Mr. W. B. Shipman
Mr. P. D. Rushton
Mr. M. Sheibani
NORMS

U.S. Nuclear Regulatory Commission
Mr. S. D. Ebner, Regional Administrator
Mr. D. S. Hood, Licensing Project Manager, NRR
Mr. B. R. Bonser, Senior Resident Inspector, Vogtle

*** END OF DOCUMENT ***
